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INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

REC'D 08 FEB 2005

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Applicant's or agent's file reference 9228SG52/GM/JFC/nbs	FOR FURTHER ACTION	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416).
International Application No. <b>PCT/SG2003/000232</b>	International Filing Date (day/month/year) 25 September 2003	Priority Date (day/month/year) 11 October 2002
International Patent Classification (IPC) or national classification and IPC Int. Cl. <sup>7</sup> G10G 1/04, 3/04		
Applicant MATSUSHITA ELECTRICAL INDUSTRIAL CO., LTD. et al		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 7 sheets, including this cover sheet.

☐ This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of sheet(s).

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☒ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☒ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☒ Certain observations on the international application

Date of submission of the demand 5 March 2004	Date of completion of the report 21 January 2005
Name and mailing address of the IPEA/AU AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA E-mail address: pct@ipaaustralia.gov.au Facsimile No. (02) 6285 3929	Authorized Officer  <b>MATTHEW HOLLINGWORTH</b> Telephone No. (02) 6283 2024

## INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/SG2003/000232

**I. Basis of the report****1. With regard to the elements of the international application:\***

- ☒ the international application as originally filed.
- ☐ the description, pages , as originally filed,  
pages , filed with the demand,  
pages , received on with the letter of .
- ☐ the claims, pages , as originally filed,  
pages , as amended (together with any statement) under Article 19,  
pages , filed with the demand,  
pages , received on with the letter of
- ☐ the drawings, pages , as originally filed,  
pages , filed with the demand,  
pages , received on with the letter of
- ☐ the sequence listing part of the description:  
pages , as originally filed  
pages , filed with the demand  
pages , received on with the letter of

**2. With regard to the language, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.**

These elements were available or furnished to this Authority in the following language which is:

- ☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of the translation furnished for the purposes of international preliminary examination (under Rules 55.2 and/or 55.3).

**3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:**

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

**4. ☐ The amendments have resulted in the cancellation of:**

- ☐ the description, pages
- ☐ the claims, Nos.
- ☐ the drawings, sheets/fig.

**5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).\*\***

\* Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17).

\*\* Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report

**IV. Lack of unity of invention**

1. In response to the invitation to restrict or pay additional fees the applicant has:

- ☐ restricted the claims.
- ☒ paid additional fees.
- ☐ paid additional fees under protest.
- ☐ neither restricted nor paid additional fees.

2. ☐ This Authority found that the requirement of unity of invention is not complied with and chose, according to Rule 68.1, not to invite the applicant to restrict or pay additional fees.

3. This Authority considers that the requirement of unity of invention in accordance with Rules 13.1, 13.2 and 13.3 is

- ☐ complied with.
- ☒ not complied with for the following reasons:

The international application does not comply with the requirements of unity of invention because it does not relate to a single invention or inventive concept only. In coming to this conclusion, the International Searching Authority has found that there are three invention:

- Claims 1-4, 19-32, 47, 49-58. The detection of pitch values of marked musical notes is considered to be a first "special technical feature."
- Claims 5-9, 33-37. The extraction of note markers from the gradient function of a sound signal's envelope is a second "special technical feature."
- Claims 10-18, 38-46, 48. The detection of pitch values by clustering is a third "special technical feature."

Since these groups of claims do not share any of the special technical features identified above, a "technical relationship" between the inventions, as defined in PCT rule 13.2, does not exist. Hence the claims lack unity.

4. Consequently, the following parts of the international application were the subject of international preliminary examination in establishing this report:

- ☒ all parts.
- ☐ the parts relating to claims Nos.

## INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

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**V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement****1. Statement**

Novelty (N)	Claims 5-19, 22-24, 33-47, 50-52	YES
	Claims 1-4, 20-21, 25-32, 48-49, 53-58	NO
Inventive step (IS)	Claims 10-18, 38-46	YES
	Claims 1-9, 19-37, 47-58	NO
Industrial applicability (IA)	Claims 1-58	YES
	Claims	NO

**2. Citations and explanations (Rule 70.7)**

- D1: US 5,038,658 (TSURUTA et al), 13 August 1991
- D2: US 5,986,199 (PEEVERS), 16 November 1999
- D3: US 5,874,686 (GHAS et al), 23 February 1999
- D4: US 6,437,227 B1 (THEIMER), 20 August 2002
- D5: WO 2001/011496 A2 (SIBELIUS SOFTWARE LTD.) 15 February 2001
- D6: Smith, L. A. et al, *Music Information Retrieval Using Audio Input*.  
Proc. AAAI Spring Symposium on Intelligent Integration and Use of Text, Image, Video, and Audio Corpora, 1997
- D7: Li, J. et al, *Mandarin Four-Tone Recognition with the Fuzzy C-Means Algorithm*.  
Proc. IEEE International Fuzzy Systems Conference, 1999

**NOVELTY (N) claims 1-4, 20-21, 25-32, 48-49, 53-58**

Claims 1, 20-21, 25-29, 48-49 and 53-58: These claims lack novelty when compared to each of documents D1 and D2.

Claims 2-4 and 30-32: The features of these claims are disclosed in D1. In column 9, lines 47-63 describe the thresholding of a power signal for the sound, effectively demarking periods of silence or "rest sections." This analysis is subsequently used to restrict the segment-marking and pitch-detecting steps:

See also Box VI, "Certain documents cited."

**INVENTIVE STEP (IS) claims 1-9, 19-37, 47-58**

Claims 1-4, 20-21, 25-32, 48-49 and 53-58: As above.

Claims 5, 19, 33 and 47: These claims do not involve an inventive step in light of D2. In column 4 of this citation, lines 55-57 state that "the robustness of the [note] segmentation process is improved by searching an amplitude envelope for rapid variations in instantaneous amplitude, and matching those locations in the amplitude envelope with the transitions in the pitch track." While there is no explicit disclosure that the amplitude envelope may be differentiated in order to identify rapid changes in the envelope, this technique is well-known and would be readily apparent to a person skilled in the art.

(Continued in supplemental box.)

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## VI. Certain documents cited

### 1. Certain published documents (Rule 70.10)

Application No. Patent No.	Publication date (day/month/year)	Filing date (day/month/year)	Priority date ( valid claim) (day/month/year)
X, P. US 6,476,308 B1	5/11/2002	17/8/2001	17/8/2001

This document discloses all the features of claims 1, 5, 29 and 33, at least.

### 2. Non-written disclosures (Rule 70.9)

Kind of non-written disclosure	Date of non-written disclosure (day/month/year)	Date of written disclosure referring to non-written disclosure (day/month/year)
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**VIII. Certain observations on the international application**

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

Claim 20 is not clear because of problems with its dependencies. In this claim, the "pitch value detecting step" can depend on claims 19-23 which do not unambiguously define such a step. (The claim can also indirectly depend on itself.) Similarly, claim 48 is unclear.

**Supplemental Box**

(To be used when the space in any of the preceding boxes is not sufficient)

**Continuation of Box V, Item 2**

Claims 5, 19, 33 and 47: These claims also lack inventive step in light of D1. In this citation, the signal's power is computed, instead of its envelope. A "variation  $d(t)$  of the power" is then computed according to equation (1) in column 11. While this method is mathematically different from calculating and differentiating the envelope of the sound signal, the effect is the same, and I consider it to be no more than a technical equivalent. In both cases, a signal indicative of the variability of the sound's amplitude is calculated and used to extract note markers.

Claims 6-9 and 34-37: These claims lack inventive step in light of each of D1 and D2. These claims relate to details of implementation for the claimed steps of envelope extraction and differentiation, and are well-known in the art. In particular, claims 8 and 36 appear to define no more than the calculation of points of inflection in the envelope, such points being the obvious candidates for note markers in light of the disclosures.

Claims 22-24 and 50-52: These claims lack inventive step in light of either D1 or D2. These claims apply the music transcribing method of claim 1 to a method of searching music. A vocalised musical piece is transcribed, and then compared to a music database to identify musically similar pieces. This "query by humming" concept is well known, and the application of the claimed invention for this purpose is not seen to confer inventive step to the claimed invention.

Claims 22-24 and 50-52: Similarly, these claims lack inventive step in light of either D1 or D2, in combination with any one of D3-D6. Each of D3-D6 discloses a music retrieval system which allows the user to hum or sing a melody. In combination with D1 or D2, they disclose all the features of the claimed invention. These combinations would be obvious to make, since D3-D6 represent a well-known application for vocal transcription, and D1 and D2 each describe a particular method of performing that transcription.